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ABSTRACT

Examining the effects of sociodramatic play and sex differences on mathematical learning and adult-observed playfulness in young children, several preliminary analyses were run of pre-test scores. Tests used were the Kindergarten Keys Mathematics Test and the Lieberman Playfulness Scale. The results of three 2(treatment) x 2(sex) analyses of variance indicated no significant main or interaction effects on receptive language I.Q., mathematical abilities, or adult-observed playfulness. The main analyses consisted of two 2(treatment) x 2(sex) analyses of covariance using pre and post measures on mathematical and adult-observed playfulness responses. The results showed that children in the sociodramatic group outperformed those in the control groups on mathematical and adult-observed playfulness abilities: there were no differences for main or interaction effects of sex resulting from the analyses. (Author/TG)

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SOCIODRAMATIC PLAY EFFECTS ON MATHEMATICAL LEARNING AND ADULT RATING OF PLAYFULNESS IN FIVE YEAR OLDS[1, 2]

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Sociodramatic Play Effects on Mathematical Learning and Adult Ratings of Playfulness in Five Year Olds[1, 2]

Abstract

Examining the effects of sociodramatic play and sex differences on mathematical learning and adult-observed playfulness in young children, several preliminary analyses were run on pre-test scores. The results of three 2(treatment) x 2(sex) analyses of variance indicated no significant main or interaction effects on receptive language I.Q.; mathematical abilities; or, adult-observed playfulness. The main analyses consisted of two 2(treatment) x 2(sex) analyses of covariance using pre and post measures on mathematical and adult-observed playfulness responses. The results showed that children in the sociodramatic outperformed those in the control groups on mathematical and adult-observed playfulness abilities; there were no differences for main or interaction effects of sex resulting from the analyses.

Sociodramatic Play Effects on Mathematical Learning and Adult Ratings of Playfulness in Five Year Olds[1, 2]

Introduction

Symbolic or "pretend" play was defined by Curry and Arnaud (1974) as the capacity of the child to transform himself into another person, situation, or event as seen through his motoric and/or verbal actions used in the enactment. Its importance for encouraging novel actions and growth in young children was established within the past 15 years by researchers, such as, Kagen (1976); Singer (1973); Bruner (1972); and, Piaget (1962). Further, selected researchers, for example, Smith and Dutton (1979); Saltz, Dixon, and Johnson (1977); and, Smilansky (1968) have explored the facilitative effects of group pretend or sociodramatic play on cognitive problem solving and language learning. The results of latter set of studies have shown that sociodramatic play was a facilitator of conceptual and linguistic learning in young children. For example, the results of Smith and Dutton (1979) indicated that sociodramatic play not only encouraged but also decreased response time on cognitive problem solving tasks in experimental versus control groups. Further, and on assorted language and cognitive tasks, the results of the studies by Saltz, Dixon, and Johnson (1977) and Smilansky (1968) showed that young children in various sociodramatic play versus control groups yielded significantly higher mean scores on language intelligence, mean length of orally generated sentences, story interpretation, memory and empathy.

Considering the importance of pretend play for developing novel actions (Singer, 1973; Bruner, 1972) and for facilitating problem solving (Smith & Dutton, 1979) and selected language and cognitive processes (Saltz, Dixon, & Johnson, 1977; Smilansky, 1968), symbolic play in group or sociodramatic form, in turn, could have the potential to effect selected mathematic's behaviors in young children as well as their playfulness capacities as objectively perceived by adults.

Here, playfulness or associative fluency was viewed as the young child's capacity to generate a number of unusual associations for objects, people, or events and was related to pretend play in that both involved the production and use of alternative responses and actions without elaboration toward imposed goals (lieberman, 1977; Zammarelli & Bolton, 1977).

Accordingly, the present study examined the effects of guided sociodramatic or group pretend play on mathematic's behaviors and adult-observed playfulness traits in young children. Further, the investigation studied the effects of sex differences on mathematic's behaviors and playfulness actions in young children.

In the area of adult-guided sociodramatic play as a facilitator of mathematic's behaviors and playfulness actions as observed in young children by adults, a great paucity of research investigations has existed (Bennett, 1973). Play of children as a facilitator of mathematic's behaviors was previously investigated by Zammarelli and Bolton (1977) and Hasan and Butcher (1973); pretend play, as an encourager of playfulness traits in young children, was examined in the research studies completed by Dansky and Silverman (1973); Sutton-Smith (1967); and, Lieberman (1965).

For the effects of play on mathematical functioning, Zammarelli and Bolton (1977) attempted to examine mathematical concept learning in children ages 10 through 12. With pre and post measures, participants in group one freely explored and manipulated a toy object and those in group two were guided in their playing with the same electronic toy while those in group three observed the toy. The conclusion was that:

> play with a specifically designated toy can lead to a greater understanding of rules embodied in a mathematical concept and a better memory for such rules than can be provided by observation of the same stimuli but without manipulation (p. 160).

Guided individual play with an electronic toy appeared to facilitate mathematics learning in children relative to the control or observation group. In addition,

Hasan and Butcher (1966) conducted a correlational study to determine the relationship between play processes and mathematical abilities in children, 10 through 12 years of age. The results of the investigation showed that a significant relationship existed between play processes and mathematical abilities. However, neither of these investigations explored differences between boys and girls in guided play on mathematical abilities.

For the effects of play on either playfulness performances or adult-observed playfulness in children, Dansky and Silverman (1973) examined nonstandard uses of objects in preschool youngsters in play, imitation (i.e., adult play-modeling) and control treatment groups on playfulness responses. The results indicated that: (a) children in the play group yielded significantly higher scores than those in imitation and control groups on playfulness responses; and, (b) playfulness facilitated the identification and use of toy objects in nonstandard or divergent ways. Secondly, requiring young children to provide alternative uses for novel and familiar toys, the results, according to Sutton-Smith (1967), were that both boys and girls gave more uses for familiar than novel toys. Play of children in individual settings appeared to greatly benefit playfulness' actions or alternative responses to familiar rather than novel toys. Third, Lieberman (1965) required adults to independently rate each child's playfulness abilities and, in turn, administered creativity tests to the participating youngsters. The results indicated that adult's ratings of playfulness were significantly correlated with several specific measures of divergent thinking.

However, for the factor of sex difference in adult guided play (on either playfulness performance or adult-observed playfulness) the results of Dansky and Silverman (1973); Sutton-Smith (1967); and, Lieberman (1965) showed that boys did not differ from girls on playfulness responses. Other studies related to

the playfulness variable were conducted by Fagot (1978a; 1978b) and Austin (1974) and focused on differences between boys and girls. The results have demonstrated differences between girls and boys on uses of play spaces and objects and on analytic play preferences.

In sum, and in a number of critical ways, the present study differed from those of Zammarelli and Bolton (1977) and Hasan and Butcher (1973) who examined play as a facilitator of mathematical abilities and those of Dansky and Silverman (1973); Sutton-Smith (1967); and, Lieberman (1965) who studied play and playfulness. First, the present study examined the effects of sociodramatic or group play while the others focused on the effects of dramatic or individual play on mathematical and playfulness abilities. Sociodramatic play, according to Singer (1977) and Bruner (1972), was not only a more developmentally advanced form of pretend play but also required the children to use greater cognitive and linguistic processes because of peer group collaboration. Since the results of the five studies showed that dramatic play facilitated or was related to mathematical abilities and playfulness, then sociodramatic play, a more developmentally advanced form of dramatic play, should show similar effects. Then too, sociodramatic rather than dramatic play was easier to employ and manage in group instruction and, therefore, may have greater relevance to working with children in classroom settings.

Secondly, the present investigation provided adult-guidance and freedom and flexibility for children to improvize and generate play routines and outcomes rather than the other studies where the adult directed children to perform and complete prescribed roles and goals in their play. Vygotsky (1966) and Piaget (1962), in particular, have long theorized that symbolic play, to maximally benefit development and learning, must display the attributes of spontaneity, improvization, and child-generated outcomes. Thus, the attributes and functions that

characterize pretend play in the present study were more proximal to those of Vygotsky and Piaget than those characteristics of play employed in the five studies surveyed.

Third, the present investigation used play without objects rather with objects as found in the other five studies surveyed. Piaget (1962) has contended that objects used with play inhibited the pretend capacity since they primarily served as mediators between the actors and their roles. Therefore, eliminating the use of objects in pretend play could, at least theoretically, provide for a direct link between actor and role for purposes of internalization and identification. Fourth, the present study employed children who were age five and in their early childhood years rather than the other studies which enrolled older youngsters in their middle childhood years. In accord with Piaget (1962), pretend play was more qualitatively and quantitatively characteristic of five rather than ten year old children. Hence, there was also a closer match between age and type of play in the present study rather than the other investigations. Accordingly, the hypotheses of major concern in the investigation were:

(a) There are differences between adult-guided sociodramatic play and control groups on five year old children's mathematical abilities.

(b) There are differences between sociodramatic play and control groups on five year old children's adult-observed playfulness abilities.

(c) There are differences between five year old boys and girls on mathematical abilities.

(d) There are differences between five year old boys and girls on adult-observed playfulness abilities.

Method

Participants

The participants were 96 children five years of age. Through the use of a table of random numbers, 24 children, 12 boys and 12 girls, were selected from 42 participants in each of four open-space kindergarten "pods" in four separate elementary schools in two adjoining school districts. After selection of the population, the participants were randomly assigned to experimental and control treatments. The participants represented a middle class socio-economic population as evidenced by the white collar occupations of their heads-of household (Warner, Meeker, & Eels, 1960). Ninety-four percent of the heads-of-household were employed in insurance, education, military, secretarial and small business enterprises.

Procedures

The investigation consisted of assessment and treatment phases. The assessment phase comprised pre and post testing and was administered in September and May of the school year, respectively. For pre and post evaluations, the children in a group setting were administered the Kindergarten Keys Mathematics Test (Harris, Lane, Sucher & Yawkey, 1976) and two adults per kindergarten-pod rated independently each participant on the Lieberman Playfulness Scale: Form K (Lieberman, 1977). In addition, the Peabody Picture Vocabulary Test: Form B (Dunn, 1969) was individually administered as a pre (but not as a post) assessment to evaluate possible I.Q. differences initially existing between treatment groups. The Kindergarten Keys Mathematics Readiness Test, a group paper and pencil battery, was administered to assess mathematical readiness behaviors across six sub-areas of quantification including number recognition, simple set theory and set relations. The classroom teacher administered the mathematic's battery to the children and scored their answer booklets. Each of the participant's responses to the 100 questions on the instrument were scored correct or

incorrect with a range of 0 to 100 points per child. The Lieberman Playfulness Scale was used by the adult to rate each child's playfulness actions. The scale contained 22 stimulus items and assessed the existence and degree of playfulness traits. Two trained adults who were unfamiliar with the goals of the study were hired to observe and then individually rate each of the children in their free play. The raters were simply told that they were gathering data to assist in the validation process of the Lieberman Playfulness Scale. Examples of playfulness traits scored during the sessions included flexibility of interactions with group members, spontaneity of motor movements and use of humor. Each of the 22 playfulness traits from the Lieberman Playfulness Scale were rated on a Likert dimension of 5 (i.e., very high) through 0 (i.e., very low) and the scores per participant ranged from 0 through 110 points. After the pre tests were administered and data analyzed for initial group differences on I.Q., mathematics, and playfulness, the treatment conditions began.

The sessions in the experimental and control groups were run by two adult female graduate assistants both having two years of kindergarten teaching experience prior to enrolling in graduate studies. Each member of the training staff was assigned to one experimental and one control group. They were systematically rotated on a weekly basis between each other's conditions to ensure that the children's performance was characteristic of intervention treatments rather than their own adult actions. In addition, the rotation of staff required thorough planning on a weekly and monthly basis throughout the duration of the study.

There were a number of varying procedures and sources of content employed in the treatment conditions. The procedures in the treatment groups lasted 15 minutes daily per week for seven consecutive months. In the experimental groups,

the participants engaged in sociodramatic play in small groups of four to five children. They defined the roles of the players and determined general and broad actions used in but not the end of the episode. Through improvization, the participants planned and executed the sociodramatic play episodes. Essentially, the children enacted common experiences which served as the content of their sociodramatic play. Examples of sociodramatic play derived from common experiences included: (a) "Feeding the Animals" based on field trips to the zoo; (b) "Buying Food" using visits to the supermarkets; (c) "Going Shopping" arising from trips to the shopping mall; and, (d) "Selecting a Book" based on experiences in the community library. The children were encouraged to describe and then enact these common experiences. In addition, they re-enacted the same sociodramatic episode a number of times although actors and felt needs changed between episodes. In the enactments, the children were encouraged to portray people, things, and situations in realistic and life-like ways without the use of play objects and props. Encouraging realistic sociodramatic play without play objects enabled the children to develop and represent their shared experiences in the episodes.

In the control groups, the children were given a number of activities which they were permitted to perform as they wished. They colored in sketches of drawings, cut out and pasted pictures on construction paper, inserted plastic geometric pieces into form boards, and fingerpainted. In addition, the participants had the opportunity to interact with and receive reinforcement from the training staff while they performed these activities.

Experimental Analysis

The factors of groups (i.e., experimental versus control) and sex (i.e., boys versus girls) were crossed orthogonally implying a 2 x 2 analysis of

variance (ANOVA). The pre test scores from the (a) Peabody Picture Vocabulary Test; (b) Kindergarten Keys Mathematics Readiness Test; and (c) Lieberman Playfulness Scale were the dependent measures. Accordingly, a 2 x 2 ANOVA was run on scores from each of the assessment instruments to determine whether the participants who were randomly assigned to groups differed within and between treatment conditions on each of the measures.

For the pre and post analyses, the factors of groups (i.e., experimental versus control) and sex (i.e., boys versus girls) were crossed orthogonally implying a 2 x 2 analysis of covariance (ANOCOVA) hierarchical design given that participants were nested within classroom (pods) which were nested within groups. The pre and post assessment scores from the Kindergarten Keys Mathematics Readiness Test and the Lieberman Playfulness Scale served as covariate and criterion variables, respectively, and analyses using the 2 x 2 ANOCOVA hierarchical designs were run on each dependent measure.

In addition, interrater agreement coefficients were calculated between the two independent adult ratings of children's observed playfulness behaviors obtained from the Lieberman Playfulness Scale in both pre and post conditions.

Results

First and on the pre test scores from the: (a) Peabody Picture Vocabulary Test (P.P.V.T.); (b) Kindergarten Keys Mathematics Readiness Test (K.K.M.R.T.); and (c) Lieberman Playfulness Scale (L.P.S.), three separate 2 (i.e., experimental versus control) x 2 (i.e, boys versus girls) ANOVAs were run. On the P.P.V.T. pre test scores, the results of the analysis indicated no significant main effects of treatment groups, F (1,92) = .55, $p > .05$, and sex, F (1, 92) = 3.73, $p > .05$, or interaction effects, F, (1,92) = .09, $p > .05$. For P.P.V.T. pre test scores, Bartlett's Test of Homogeneity of Variance yielded a Chi square

of 6.23, df = 3, $p > .05$. In addition, the results of the analysis for the K.K.M.R.T. pre test scores showed neither significant main effects of treatment groups, F (1,92) = .57, $p > .05$, and sex, F (1,92) = 3.45, $p > .05$ nor significant interaction effects, F (1,92) = .17, $p > .05$. For K.K.M.R.T. pre test scores, Bartlett's Test of Homogeneity of Variance Yielded a Chi square of 8.87, df = 3, $p < .05$. Further, and on the L.P.S. pre test scores, the results of the analysis indicated no significant main effects of treatment groups F (1,92) = 3.22, $p > .05$, and sex, F (1,92) = 1.08, $p > .05$, or interaction effects, F (1,92) = 2.51, $p > .05$. For the L.P.S. pre test scores, Bartlett's Test of Homogeneity of Variance yielded a Chi square of 4.74, df = 3, $p > .05$. The pre test P.P.V.T. scores appeared in Table 1.

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Secondly, and for the pre-post scores derived from the: (a) K.K.M.R.T.; and (b) L.P.S. measures, two separate analyses using 2 (i.e., experimental versus control) x 2 (i.e., boys versus girls) ANOCOVA hierarchical designs as described in Myers (1979) were run per assessment measure. The pre test served as covariate and post test as criterion variables in the designs.

On the K.K.M.R.T. mathematic's measure, the results indicated significant main effects for treatment groups, F (1,4) = 4.75, $p < .05$ but not significant main effects for sex, F (1,4) = .26, $p > .05$ or for interaction effects, F (1,4) = .29, $p > .05$. For within treatment groups, the results showed no effects for classrooms on K.K.M.R.T. scores, F (1,4) = 2.03, $p > .05$. Using the Scheffé post hoc statistic on the main effect of treatment group, the results indicated that children in the sociodramatic group yielded significantly higher scores on the

K.K.M.R.T. than those in the control. Although there was a significant difference in the predicted means on K.K.M.R.T. scores, a test of the assumption of homogeneous slopes indicated that the slopes were not parallel, F (3,85) = 3.76, $p < .05$. The plot of the heterogeneous slopes showed that the sociodramatic treatment had its greatest effect for those children who had the lowest pretest scores. Further, the plot of the heterogeneous slopes for prediction of K.K.M.R.T. scores in both sociodramatic and control groups appeared in Figure 1 below.

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On the L.P.S.playfulness assessment, the results of the analysis showed significant main effects for treatment groups, F (1,4) = 23.48, $p < .05$ but no significant main effects for sex, F (1,4) = .39, $p > .05$ or interaction effects, F (1,4) = 1.34, $p > .05$. For within treatment groups, the results indicated no effects for classrooms on L.P.S. scores, F (1,4) = .52, $p > .05$. With the Scheffé post hoc statistic on the main effect for treatment group, the results showed that children in the sociodramatic group received significantly higher scores and ratings on the L.P.S. than those in the control. The results on the homogeneity of slopes for prediction of L.P.S. scores indicated that the slopes were parallel, F (3,85) = .76, $p > .05$.

Pre and post test means and standard deviations on the K.K.M.R.T. and L.P.S. measures appeared in Table 2.

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Interrater agreement coefficients between two independent adult ratings on playfulness actions of the children in pre and again in post sessions were

calculated. The results showed that the interrater agreement coefficients in pre and post sessions were .88 and .92, respectively.

Discussion and Conclusion

In the present study and on pre test measures of receptive language intelligence, mathematical readiness, and playfulness, the children randomly assigned to groups by treatment and gender appeared to be relatively homogeneous. However, from the analysis of pre and post scores, the results showed that children assigned to the sociodramatic yielded significantly higher mean scores than those in the control groups on both mathematical readiness behaviors and adult-observed playfulness abilities. And, no other differences on pre and post measures were significant. Further, heterogeneous slopes for the prediction of mathematical scores were obtained.

The results of the present study supported those of Zammarelli and Bolton (1977) on the facilitative effects of dramatic play on mathematical behaviors of children. In addition, the results of the study conducted by Hasan and Butcher (1960) showed a significant relationship between dramatic play behaviors and mathematical performance in 10 year old children. Although the investigations of Zammarelli and Bolton (1977) and Hasan and Butcher (1960) were conducted with 10 through 12 year old children, using dramatic play with props and adult direction of their play, it appeared that sociodramatic play without props and with five year old children in the present study also facilitated mathematical behavior. Re-enacting group experiences in sociodramatic play, such as, "Going Shopping" and "Visiting the Zoo" can lead to a greater understanding of mathematical behaviors than can be provided by individual paste, cut and craft activities. In addition, the plot of the heterogeneous slopes for the prediction of mathematical scores in the present study indicated that sociodramatic play had its greatest

effect for those children having the lowest pretest scores. In the sociodramatic play group, those children with the lowest mathematical pretest scores had the potential for greater improvement compared to those with the highest mathematical pretest scores.

Although focusing on language intelligence and selected languages processes, the results of Saltz, Dixon and Johnson (1977) and Smilansky (1968) and those of the present study both showed significant effects of sociodramatic play on growth and learning in young children, four through seven years of age. At the theoretical level, Vygotsky (1968) and Piaget (1962) have both characterized sociodramatic play as a cognitive process. It required the child to: (a) employ thought structures to reconstruct reality; (b) achieve socially-derived group goals; (c) develop meaningful understandings and relations basic to situations, events, and roles which were enacted; and (d) suspend reality in qualitatively differing ways to verbally and motorically enact and re-enact the episodes. Thus, the results of the present study together with those of Saltz, Dixon, and Johnson (1977) and Smilansky (1978) as well as those of Zammarelli and Bolton (1977) and Hasan and Butcher (1966) have shown that pretend play, in sociodramatic and dramatic forms, was a dynamic and meaningful facilitator of mathematical and other cognitively-related abilities at preschool and middle childhood levels.

A second result of the present study indicated that children in sociodramatic play compared to those in control groups displayed significantly greater adult-observed playfulness responses. The second finding was of considerable interest as an independent as well as a related finding to the facilitative effects of sociodramatic play on mathematical abilities.

As an independent finding, it supported the results of Dansky and Silverman (1978) and Sutton-Smith (1967) which indicated that play (relative to control

group) activities facilitated playfulness responses in young children. Further, and consistent with Lieberman's (1968) procedures in which an adult scored playfulness traits of children engaged in play, the results of the present study showed that sociodramatic play encouraged playfulness abilities. Although the adults who scored children's playfulness abilities were not provided with any information and were essentially naive about the study's real purposes, the children in the sociodramatic were rated higher than those in the control groups on playfulness exhibited in free play settings. Since playfulness abilities on the Lieberman Playfulness Scale (Lieberman, 1977) emphasized nonstandard or alternative uses of objects, situations, events, and people, children in the sociodramatic play group could have conceivably developed, learned, and practiced some of these actions through their pretend play. In support, Dansky and Silverman's (1975) results also indicated and Sutton-Smith (1963) suggested that pretend play directly benefited alternative or divergent responses in young children.

Considering the effects of sociodramatic play on children's observed responses together with its effect on mathematical behaviors resulted in several interesting propositions. Bennett (1973), in surveying studies on the effects of children's play on mathematical abilities and divergent thinking, noted that the conceptual strategies required for mathematical learning, for playing, and for divergent thinking were similar. According to Bennett (1973), the intersect between mathematical and play behaviors was problem solving or productive thinking strategies such as classifying, decentering, and reversing. Further, Hasan and Butcher (1966) noted a significant relationship between divergent thinking and mathematical abilities. Similarly, Lieberman's (1965) results showed a significant relationship between divergent thinking and playfulness and the findings of the present study indicated that mathematical abilities and adult-observed playfulness were

facilitated by sociodramatic play. Conceivably, children participating in sociodramatic play were developing and practicing productive thinking strategies which were similar to those required for mathematical growth and for playfulness.

For the factor of sex, the results of the present study showed no significant differences on either mathematical abilities or adult-observed playfulness responses. Zammarelli and Bolton (1977) and Hasan and Butcher (1966) did not examine sex differences on mathematical abilities. However, for playfulness responses, the results of the present investigation were in agreement with those of Dansky and Silverman (1978) and Sutton-Smith (1967) which indicated that boys did not differ from girls on playfulness abilities. In studies related to playfulness, conducted by Fagot (1978a, 1978b) and Austin (1974), their results indicated that boys yielded significantly higher mean scores than girls on uses of play objects, spaces and analytic play preferences. Uses of play spaces and objects and analytic play dimensions were related to playfulness abilities in quality and quantity of play actions on objects and in situations. However, Fagot and Austin employed children older than five years of age in their research studies. Accordingly, the playfulness-related behaviors investigated by Fagot and Austin as well as differences between girls and boys on mathematical abilities, according to Maccoby and Jacklin (1976), were thought to have their onset during the adolescent rather than the early years.

There were several possible implications of the results of the study for educational practice. First and within the area of early childhood, sociodramatic play historically has been viewed as crucial to socio-emotional and personality growth of young children at the preschool and kindergarten levels. Further, and in addition to sociodramatic play for affective growth, it could be employed with young children as a facilitator of mathematical and perhaps

playfulness abilities. Also, results of other current research studies have shown that sociodramatic play facilitates language behaviors in young children. Second, and in relation to the rush "back-to-basics," sociodramatic play could be re-introduced and justified in school programs for young children given its important contributions to both mathematical and language abilities. The research justification of its contributions to the basic academic subjects of 'rithmetic and reading make it a viable, useful and efficient tool for group instruction for kindergarten children. Third, sociodramatic play facilitated adult observed playfulness actions in young children. Since playfulness capacities appeared to be directly related to divergent or productive thinking abilities, sociodramatic play may be useful in developing and providing opportunities for practicing crucial survival skills of productive thinking. Accordingly, greater emphasis in schooling could be given to sociodramatic play for its potential effects on divergent thinking. Fourth, the significant effect for sociodramatic play on mathematical and playfulness abilities supported adult-guided but student-directed instructional activities. The goals and outcomes of student-directed activities are developed by the children and evolved from within group settings. Thus, sociodramatic experiences and activities, where goals and outcomes are developed by the student, could be employed in any one of the subject areas.

The present study had a number of limitations. First, the results of the investigation were specific to the study. Secondly, they were limited to the procedures employed in the treatment conditions and to the instruments used in assessing mathematical behaviors and adult-observed playfulness actions in children.

Additional research could be developed to explore the following questions: (a) what are the effects of dramatic and sociodramatic play of young children

on cognitive abilities in mathematics, reading and social education?

(b) What differences, if any, exist between young children's abilities on divergent thinking, sociodramatic play and mathematics learning?

(c) What similarities and differences exist between the cognitive processes used in sociodramatic play and those used in divergent thinking?

Footnotes

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[2]Portions of the paper were presented by K. C. Jones, E. J. Hrncir, and the author at the Tenth Annual Meeting of the Northeastern Educational Research Association, Ellenville, New York, November, 1979.

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Table 1

Pre-test Means and Standard Deviations for Factors of Treatments and Sex on the P.P.V.T. Measure

	Factors							
	Treatments				Sex			
Measure	Experimental		Control		Boys		Girls	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
P.P.V.T.	100.17	31.56	93.00	115.31	89.67	31.17	115.25	34.27

Table 7

Pre and Post Test Means and Standard Deviations for Factors of Treatments and Sex on the K.K.M.R.T. and L.P.S. Measures

		Factors							
		Treatments				Sex			
		Experimental		Control		Boys		Girls	
Measures	Pre-Post	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
K.K.M.R.T.	Pretest	55.67	16.80	60.83	11.48	53.92	10.84	59.38	15.17
	Posttest	68.13	8.87	64.20	11.25	60.54	17.74	60.64	17.10
L.P.S.	Pretest	36.92	9.02	31.17	6.78	35.96	6.39	30.83	8.16
	Posttest	38.83	9.99	32.01	6.81	37.13	9.74	33.76	9.18

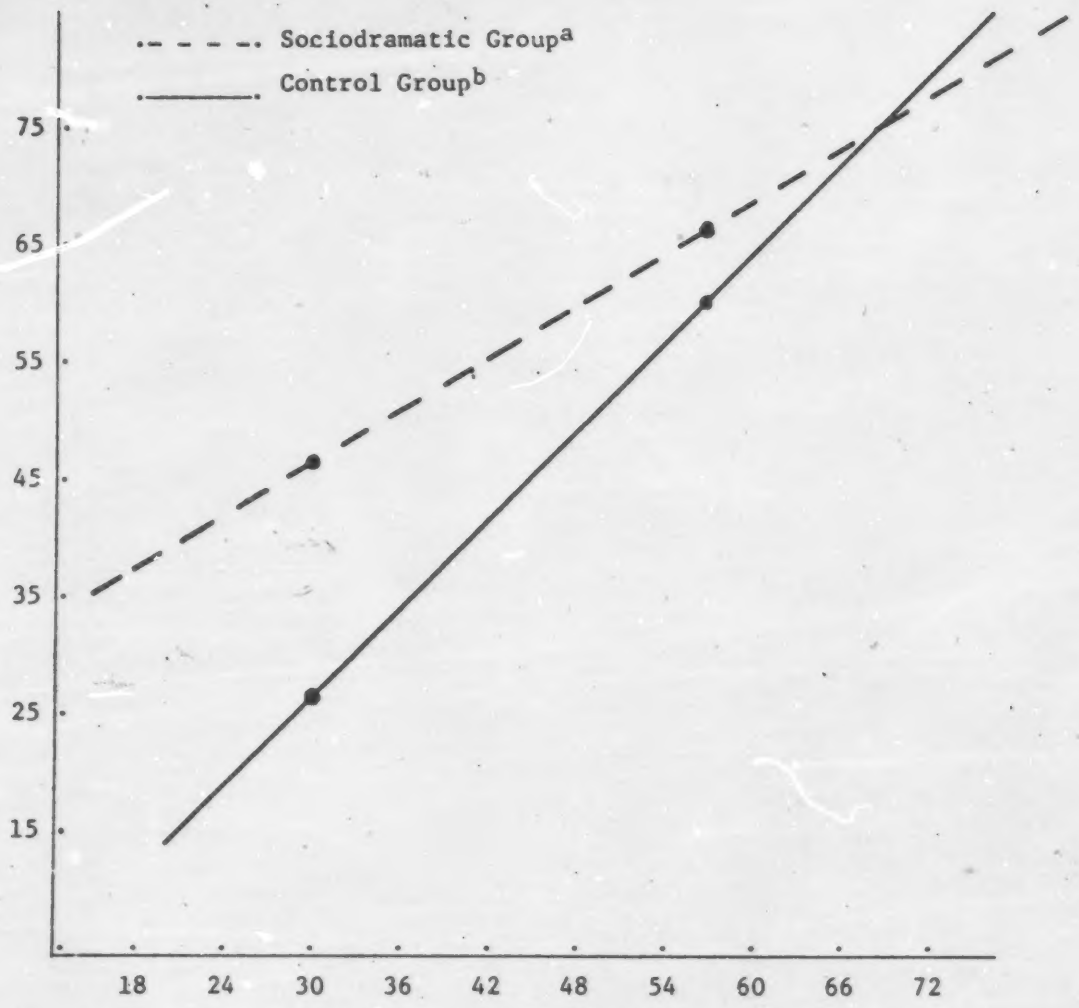

Figure 1

Heterogeneous Slopes for Prediction
of K.K.M.R.T. Scores for Sociodramatic and Control Groups

(a) K.K.M.R.T. prediction = 25.02 + .71 (K.K.M.R.T. Pretest Scores)

(b) K.K.M.R.T. prediction = -10.73 + 1.25 (K.K.M.R.T. Pretest Scores)